

**REMARKS**

Independent claim 1 has been amended to incorporate the features of claims 22 and 23, which have been canceled, thus rendering moot the 102 rejections based on Culp or da Costa. This leaves only the 103 rejections.

Considering first the rejection of claims 17 and 22 (incorporated into claim 1) as obvious from either Culp or da Costa, it is submitted that neither Culp nor da Costa or Culp or da Costa in combination teach or suggest claim 1 as amended, or any of the claims that depend thereon including specifically claim 17.

In rejecting the claims as obvious from Culp or da Costa, the Examiner takes the position that piezoelectric ceramics are well known prior art piezoelectric actuators. Even assuming *arguendo* the Examiner is correct, Applicant submits that piezoelectric ceramics are not reversibly responsive elastomeric materials selected from the group selected from the group consisting of electroactive polymers, electrically activated polymer gels, optically activated polymers, chemically activated polymers, magnetically activated polymers, thermally activated polymers and shape memory polymers, as required by claim 1, as amended. A piezoelectric ceramic is a crystalline material, not a reversibly responsive elastomeric material as required by claim 1, as amended. Please see attached Exhibit A from Wikipedia.

Moreover, there are other differences. Culp teaches a pump that operates by the movement of waveplates, which are composed of a series of what Culp characterizes as “dimorphs”. According to Culp the dimorphs move by shear deformation caused by polarization due to the application of an electric field. The dimorphs are divided into two body portions (Fig. 1, items 4a,b) which are separated by electrodes (Fig. 1, items 8 and 6a,b). In Culp, the sides of the dimorphs move in position relative to one another when an electrical field causes a shear deformation. None of the material of the dimorph bends or changes in volume.

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In fact, Culp explicitly teaches that “the volume of the dimorph remains essentially independent of the state of deformation.” (Col. 3:62-63).

And, da Costa teaches a hermetic compressor whereby a gas is compressed from displacement into chambers of successively smaller volumes created by the movement of successively lower volume pistons made of piezoelectric material.

Thus, neither Culp nor da Costa can be said to teach or suggest claim 1, as amended, and no combination of Culp and da Costa reasonably could be said to achieve or render obvious claim 1, as amended, or any of the claims that depend thereon.

Turning to the rejection of claims 19-21 and 23-26 as being unpatentable over either Culp or da Costa in view of Chinn et al. (U.S. Patent 6,685,442), as noted *supra*, claim 1 has been amended to incorporate the limitations of claim 23. The deficiencies of both Culp and da Costa alone or in combination with respect to independent claim 1 are discussed above.

In the rejection, the Examiner cites Chinn et al. as teaching actuator material formed of an electroactuated polymer gel, and takes the position that it would be obvious to one skilled in the art to substitute the electroactuated polymer gel of Chinn et al. for the ceramic piezoelectric actuator of Culp or da Costa. Such substitution would be inoperative, since Chinn et al. requires a non-conductive housing provided with two separate chambers separated by a porous frit in which the conductive polymer is held in one chamber and electrolytic solution used as a source of charged ions is held in a second chamber. Neither Culp nor da Costa teach or suggest a comparable structure. Accordingly, no combination of Culp and Chinn et al. or da Costa, or Culp, da Costa and Chinn et al. reasonably could be said to achieve or render obvious claim 1, or any of the claims dependent thereon.

Having dealt with all the objections raised by the Examiner, the Application is believed to be in order for allowance. Early and favorable action is respectfully requested.

the cost of the added claim fees accompanies this Amendment.

In the event there are any fee deficiencies or additional fees are payable, please charge them (or credit any overpayment) to our Deposit Account Number 08-1391

Respectfully submitted,



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**CERTIFICATE OF ELECTRONIC FILING**

I hereby certify that this correspondence is being deposited with the United States Patent Office via the electronic filing procedure on April 2, 2009.

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